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ABSTRACT

As part of the activities at the Research Institute in Education of Learning Disabled Children, work was carried out with a group of about 30 children (grades 4 through 6) disabled in the comprehension of written language. Most of these children, when reading, went beyond using prior knowledge to provide schemata and interpretations; they distorted text information to make it conform to prior knowledge. They could comprehend text but can not learn from text. Several of the children used this same strategy even when a written text is read to them, suggesting that one basis for this unproductive strategy may lie in characteristics differences between spoken and written language. The children did learn well from class discussions. Many of the component tasks in typical verbal intelligence tests appeared to measure ability to use prior knowledge (e.g., vocabularly, similarities, information). Thus, the strategy these children applied unsuccessfully to written language comprehension can be applied successfully to typical intelligence tests. Early decoding problems and early success with the strategy in beginning reading tasks were among possible influences leading to its development. Plausible approaches to treatment included those that emphasize attention to cohesive markers (words that signal relationships between sentences and even paragraphs, and thus hold the text together). (Author/SB)

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PRIOR KNOWLEDGE AS A HANDICAPPING CONDITION

Katherine Maria and Walter MacGinitie

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The Institute is composed of five independent task forces that focus on specific academic skill areas fundamental to the school curriculum: basic reading and spelling, reading comprehension, arithmetic, and study skills. All of the task forces are dedicated to the identification of specific disabilities in these skill areas and to the development of effective remedial instruction.

Principal Investigators

N. Dale Bryant, Ph.D.
Jeannette Fleischner, Ed.D.
Walter MacGinitie, Ph.D.
Margaret Jo Shepherd, Ed.D.
Joanna Williams, Ph.D.

Institute Director

Frances P. Connor, Ed.D.

Additional information on research activities of the Institute may be obtained by writing:

Research Institute for the Study of Learning Disabilities
Box 118
Teachers College, Columbia University
New York, N. Y. 10027

Abstract

How is it possible for some LD children to be poor at reading comprehension when they have good verbal intelligence and can decode adequately? Intensive work with several children, age 9 to 13, who fit this description reveals that most of them, when reading, go beyond using prior knowledge to provide schemata and interpretations; they distort text information to make it conform to prior knowledge. In a sense, they can comprehend text but can not learn from text. Several of the children use this same strategy even when a written text is read to them, suggesting that one basis for this unproductive strategy may lie in characteristic differences between spoken and written language. Indeed, the children learn well from class discussions. Many of the component tasks in typical verbal intelligence tests appear to measure ability to use prior knowledge (e.g., vocabulary, similarities, information). Thus, the strategy these children apply unsuccessfully to written language comprehension can be applied successfully to typical intelligence tests. Early decoding problems and early success with the strategy in beginning reading tasks are among possible influences leading to its development. Plausible approaches to treatment include those that emphasize attention to cohesive markers.

PRIOR KNOWLEDGE AS A HANDICAPPING CONDITION*

Katherine Maria and Walter H. MacGinitie

One of the fascinations of learning disabilities as a field of study is that the child whose learning disability appears so handicapping in particular endeavors may seem so competent in all else. Indeed, so dramatic is this contrast that many incline to limit the term "learning disabled" to children of average or above-average intelligence, although they advance no argument for exempting lesser minds from the same defects, whatever they may be. Thus, many of the learning disabled children who have received careful study are children who appear bright and able in daily life and who achieve good scores on tests of intelligence, but who find inordinate difficulty in specific tasks that are all-important in school. And school, and the society it serves, are often not charitable in their assessment of the child who chances to have the wrong sort of deficiency.

> So, oft it chances in particular men, ...
> Carrying, I say, the stamp of one defect,
> Being nature's livery, or fortune's star, --
> Their virtues else -- be they as pure as grace,
> As infinite as man may undergo --
> Shall in the general censure take corruption
> From that particular fault ....
>
> (Hamlet, Act 1, Scene 4)

The best-known of these contrasts between apparent general ability and difficulty with a specific school task is the difficulty that many otherwise able learning disabled children encounter in learning to read. It is not surprising, of course, that reading should be so widely recognized as a stumbling block for learning disabled children, for reading is a vital skill and a complex one with many perceptual and cognitive components.

It is the perceptual aspects of the reading task that have received the greatest attention in relation to learning disabilities, but recent work has begun to focus, also, on the comprehension difficulties of some learning disabled children (e.g., Berger, 1978; Weaver & Dickinson, 1979).

The contrast, exhibited by some learning disabled children, between specific difficulty in reading comprehension and high verbal intelligence is particularly intriguing. Is not language comprehension the basis for intelligence (Humphreys, Park, & Parsons, 1979)? Is not reading reasoning (Thorndike, 1973-74)? Are not reading comprehension scores and cognitive ability scores highly correlated (Thorndike, 1973-74)? Yes, but an occasional learning disabled child is among the exceptions that make the correlation less than perfect.

But what are the mechanisms of this exception? How does the child function to achieve high intelligence scores and poor reading comprehension? This paper will describe our work with a small group of such children, describe our understanding of their difficulties, and develop a description of a distinct subgroup of these children for whom prior knowledge is an instrument in creating a specific disability.

In the past year, as part of our work for the Research Institute in Education of Learning Disabled Children, we have worked extensively with a small group of about thirty children in grades 4-6 whom we have designated disabled in the comprehension of written language.

We have called these children disabled because we consider them a subgroup of the category of learning disabled children as defined by the U.S. Congress in Public Law 94-142. Our identification of these children as learning disabled does not include the implication of neurological deficiencies that are assumed in some definitions of learning disabilities. Also, their problems are not caused by mental retardation, cultural disadvantages, emotional disturbance or inadequate teaching. They are middle-class, suburban youngsters of adequate intelligence who appear to be learning in school when the task does not require substantial amounts of reading. Their teachers are concerned and dedicated as well as competent, so the children's instruction is at least adequate by normal standards.

These children were referred to us by their teachers as being children who have difficulty in understanding what they read. The fact that they are all reading at least a year below grade level on a standardized test supports their teachers' opinions, as did our work with them. When these children are asked to recall, or answer questions about written passages, their apparent understanding of the text is typically not the understanding that the author intended to evoke or the understanding that would be normally expected.

We have called these children disabled in the comprehension of written language rather than reading comprehension disabled because they exhibited problems in comprehension when we read the text to them as well as when they read it themselves. However, we believe it is important to point out that these children exhibited problems in comprehension in a particular kind of listening situation, that is, listening to written text presented orally. While this is the traditional way in which listening comprehension has been assessed (e.g., Durrell, Hayes & Brassard, 1970), it is by no means

the most usual listening situation. Therefore, describing their difficulty as a problem in the comprehension of written language seems more appropriate to us.

Many studies (e.g., Smiley, Oakley, Worthen, Campione, & Brown, 1977; Berger, 1978; Weaver & Dickinson, 1979) have described subjects similar to ours but have labelled them variously as "learning disabled," "dyslexic," "reading disabled," or just plain "poor readers." This variety of names is confusing. The use of the global label, "learning disabled," to refer to what is essentially a subgroup of learning disabled children who are poor readers is especially confusing yet apparently quite widespread (Williams, 1977). Only a few studies (e.g., Denckla & Rudel, 1976) have compared the subgroup of learning disabled children with reading problems to a subgroup without reading problems. This is probably because the great majority of learning disabled children do have problems in reading (Kirk & Elkins, 1975).

One cannot avoid labels entirely; we cannot talk about phenomena efficiently without identifying them with a name. However, if we begin with a description that avoids a label, it may lessen the confusion in citing the findings of these studies. Generally, the recent studies that have investigated the poor reading performance of upper grade children have described the group with reading problems as being one to three years below grade level despite adequate instruction. They are further described as having adequate intelligence with no overt signs of emotional disturbance or cultural deprivation. Thus, the descriptions are similar to ours despite the use of various labels.

While the children we studied shared a problem in comprehension, they differed in several ways. Some of them read aloud slowly and haltingly and sometimes had to be given help with a word, suggesting that their decoding skills were not automatic. Others in the group read aloud quickly and easily, yet demonstrated a lack of understanding that sometimes even exceeded that of the poor decoders. These children seemed to be "word callers" as described in the reading research literature (e.g., Jenkins, Barksdale, & Clinton, 1978).

Golinkoff (1975-1976) and Cromer (1970) also distinguished subgroups of poor comprehenders on the basis of decoding ability. It is important to remember that both subgroups in our group of poor comprehenders had problems in listening, as well as reading, so that difficulty in decoding was not a sufficient explanation of the comprehension problem.

The children we studied also differed in verbal ability. The subgroup that we designated "less verbal" tended to give very sparse recalls, yet the information that they included was often correct. At times, they appeared to have trouble expressing themselves. When asked questions about a passage, they were often unable to answer.

The other subgroup, which we designated "more verbal", gave quite extensive recalls; however, these recalls often included a preponderance of unimportant information. At times these children entirely missed the point of the passage and might even include information that contradicted the information in the text. There was often a substantial amount of added or inferential information contained in their recalls. In a recent study, Weaver and Dickinson (1979) also divided a poor reader group similar in age to ours into subgroups differing in verbal ability. Their findings are generally consistent

with our observations of differences in recall of poor readers related to verbal ability and with our characterization of the recalls of poor readers who are at least verbally adequate as substantially inferential.

Variation in the performance of poor readers has been noted by many investigators (e.g., Vellutino, 1979; Eisenberg, 1979). This variation is assumed to be the result of different patterns of causation. Perhaps because the more extrinsic causal factors are excluded by most definitions of learning disability, researchers in the field of learning disabilities have usually sought to define subgroups within the disabled population on the basis of more intrinsic factors such as deficiencies in basic processing (Johnson & Myklebust, 1967) or neurological differences (Mattis, French, & Rapin, 1975).

There are several problems with an approach that moves directly to differences in basic processing or neurological differences as a causal explanation of poor reading performance. The problems stem from the complex and interactive nature of the reading process. In order to understand the difficulties in a search for subgroups of poor readers based on differences in basic processes, it is necessary to have some idea of the manner in which these basic processes interact in the comprehension of written text.

Two theorists who have devised models of interactive processing in reading are Rumelhart (1977) and Kintsch (1979). Rumelhart's model describes the processes by which a reader might arrive at the identification of a word, so that his is primarily a model of decoding. Earlier models, like that of Gough (1972), suggested that understanding of a text resulted from the reader's progression through a hierarchy moving from the identication of features to the recognition of letters and words and finally to a processing of sentences

and text. Rumelhart's (1977) model views the readers as engaging in parallel processing at many levels at the same time. In this model, processing moves in two directions: bottom up, as in the Gough model, and also top down, so that knowing what the story is about and identifying letters in a word contribute simultaneously to the identification of a particular word. In an important sense, this more sophisticated understanding of reading blurs the distinction between decoding and comprehension, since each is seen as interacting with the other. Unlike Goodman (1976) and Smith (1977), who have focused on the importance of top-down factors, such as context, in word identification, Rumelhart insists on the importance of both top-down and bottom-up processing in word identification.

Kintsch's (1979) model also assumes parallel processing from the two directions -- top-down and bottom-up. This model is a model for comprehending text. It assumes the processes of word identification, access of word meanings, and syntactic analysis as bottom-up processes going on at the same time as top-down processes.

Comprehension of text is viewed as taking place in cycles. The model of processing begins with an input cycle consisting of a number of propositions, which are the semantic representations of the surface information in the text. Each proposition consists of a predicate (a verb or relation) and one or more arguments (nouns or other propositions).

Sentence boundaries often determine the number of propositions included in the input cycle, but if a sentence is too long, it will be processed clause-by-clause (Jarvella, 1971). The reader's short-term memory capacity will also

affect the number of propositions included in the input cycle. In order to connect the propositions of the first input cycle to those of the second input cycle, some of the propositions of the first input cycle must be retained in short-term memory. Since this short-term memory capacity is limited, only some of the propositions can be retained, so that some of the capacity is free to process the propositions in the next input cycle. The other propositions are stored in long-term memory. Which propositions are retained in short-term memory seems to be based on the importance of the propositions and their recency, at least in studies using college students as subjects (Kintsch, 1979). Younger readers or poor readers might have a different strategy for selecting the propositions to be retained in short-term memory.

Propositions that are the input in the second cycle are matched, on the basis of shared arguments, with propositions retained in short-term memory. If no match is found, a search is made of long-term memory for a match. If a match is not found in long-term memory, either an inference is made or comprehension breaks down.

The processes just described are considered bottom-up processes in the Kintsch model. Like Rumelhart, Kintsch insists on the importance of both top-down and bottom-up processes, although he has not yet specified the top-down processes in the same detail as the bottom-up processes. Top-down processes would involve factors like the reader's goal for reading, his world knowledge, and the schemata that structure the text. These top-down processes are extremely important because usually a higher level process will make a decision as to the particular meaning to be encoded on the

basis of context long before lower-level analyses are completed (Kintsch, 1977).

The Rumelhart and Kintsch models of text processing show how there could be many different sources of reading problems. To consider just one possibility, suppose some poor readers have a poor short-term memory capacity for verbal material as suggested by Perfetti and Goldman (1976). In some readers, limited short-term memory capacity might affect memory for letters in word identification. In other poor readers, it might limit the number of propositions included in short-term memory in each input cycle. In others, it might affect the number of propositions that are retained in short-term memory as the next cycle is processed. And this only considers one type of deficit. Clearly, subdividing problems in reading according to problems in basic processing is an extremely difficult task.

Moreover, the reading problem may be due to faulty programming rather than to any deficit in basic processes. The interactive nature of the reading process and the limited capacity of memory force the reader to allocate his resources or, in other words, program his processing. This programming involves the use of particular strategies, so that the problem may be the use of a strategy inappropriate for the particular reading task. There is evidence that some poor readers do use inappropriate strategies in memory tasks (Torgesen, 1977; Torgesen and Goldman, 1977). It is possible, of course, that some children use a strategy that is ordinarily not optimal for a particular task but that is appropriate for particular children, since it compensates somewhat for a basic processing deficit.

Since possible differences in basic processing are essentially limitless, and since we cannot be sure that a child's use of an inappropriate strategy is due to deficits in basic processing, it seems more useful to focus attention on the level of strategies and to attempt to study reading problems according to the strategies used.

A primary reason for trying to identify causes of reading disabilities is to suggest methods of remediation to improve that performance. Remedial programs designed to improve deficits in basic processing (e.g., Frostig & Horne, 1964) have generally improved performance in the tasks presumed to require the particular type of processing (e.g., figure ground perception) but have not improved reading performance (Hammill & Bartel, 1975). The strategies a reader uses are more directly related to the reading process. Therefore, a search for causation at this more proximate level may be more useful in designing procedures to improve reading performance. Such procedures might include instruction in new strategies and thus provide a child with a wider variety of strategies from which to choose when confronted with a particular reading task.

The work of Spiro and his associates at the Center for the Study of Reading (Spiro, 1979; Spiro & Smith, in press; Spiro & Tirre, 1980) has involved the classification of poor readers in terms of the strategies they use in reading comprehension. It is important to note that Spiro's classification is a classification of poor readers. It is difficult to classify good readers according to the strategies they use, because they are flexible and adjust their strategy to fit the particular reading task (Frederiksen, 1975). It appears that poor readers are less likely to do

this but tend to use a particular strategy whether it is task appropriate or not.

Spiro (1979) has found evidence to support the view that poor readers tend to over-rely either on top-down processing or bottom-up processing. The individual poor reader, however, does not over-rely on top-down processing at one time and over-rely on bottom-up processing at another time (Spiro & Smith, in press). The poor reader who over-relies on top-down processing decides what the passage is about and ignores details that might disconfirm the hypothesis. The poor reader who over-relies on bottom-up processes has difficulty seeing beyond the details to the total meaning.

The Kintsch (1979) model has suggested the nature of the bottom-up processes that would be involved in this failure to go beyond the details. Concentration on matching one input cycle to the next without making necessary inferences or more distant connections might result in this inability to comprehend the whole.

Recent research in psycholinguistics and artificial intelligence has thrown some light on the nature of the top-down processes and has pointed up their importance. Basically, top-down processes at the level of comprehension of text involve the use of knowledge that the reader brings to the task. Artificial intelligence models of the structure of knowledge (Winograd, 1977) suggest that knowledge is stored in frames or schemata. A frame or schema is our encoded representation of what things are like or how they happen in real life.

These frames or schemata can exist at various levels. A reader can have a frame for communication situations in general. Examples of frames

involving knowledge of communication situations would be the cooperative principle (Grice, 1975) and the given-new contract (Clark & Haviland, 1977).

A reader might also have a frame for a particular communication situation, for example, listening to or reading a narrative. Narrative story schemata have been devised by several researchers (Stein & Glenn, 1979; Mandler & Johnson, 1977; Rumelhart, 1975) and the effect of these schemata has been studied extensively. Apparently children differ in their use of these schemata as a function of age (Stein & Glenn, 1979) and reading level (Weaver & Dickinson, 1979).

A reader might have a frame or schema for a particular word. A frame for a word is different from a definition of the word in that it involves features usually associated with the word as well as the criterial features that the definition provides (Winograd, 1977). Thus, a frame for gorilla might include knowledge of where it lives, how it acts, what it eats, knowledge not included in the definition of gorilla.

Spiro's (1979) classification of poor readers is very useful, since it is a classification on the level of strategies that focuses attention on the different ways in which top-down and bottom-up processes can affect comprehension. However, it appears to us, from our work with children who are disabled in the comprehension of written language, that there are further important differences within Spiro's general categories. Among the children we have worked with, there are those whose unproductive comprehension strategies could be characterized in the following ways.

(1) Children who do not interrelate sentences or other major textual units. These children interpret each sentence separately and seem

unaware of the contradictions that arise when they apparently apply first one schema then another in interpreting the text. They do not maintain a common schema. These children would probably be among those that Spiro would classify as "bottom-up" readers.

(2) Children who inflexibly apply an initial hypothesis and text-based schema. These children form an interpretation of one or more of the first sentences in the text and try to interpret all the subsequent text in conformity with this initial interpretation. These children are aware of contradictions. In fact, they often are forced to give very far-fetched interpretations to later portions of the text to make them fit the initial interpretation. These children are probably exhibiting one form of "top-down" text processing.

(3) Children who overextend a general framework from prior knowledge. These children seem to exhibit another form of "top-down" text processing. They use a few words in the text to call up related background knowledge, but are not much constrained by the information in the text. They read as if the text is simply saying whatever it is that they already know. In Piagetian terms, these children are assimilating the text to their schemata, but they are failing to accommodate. When the data source is written text, these children fail to take account of the structure of the external data and use it to modify their schemata. The remainder of this paper will focus on the strategy that characterizes this third type of poor reader, which we shall refer to as a non-accommodating strategy.*

*The second type of poor reader can also be thought of as using a non-accommodating strategy. Unlike the third type of poor reader, who fails to accommodate content schemata to new information, the second type of poor reader fails to accommodate schemata concerning text structures to a new text structure.

Of the 30 children we have worked with, 8 fit this description.

Spiro (1979) is one of the few researchers who has called attention to the possibility that prior knowledge might interfere with the comprehension of a text. Most researchers (e.g., Pearson, Hanson, & Gordon, 1979; Bower, Black & Turner, 1979) have generally focused on the importance of prior knowledge as an aid to understanding. Prior knowledge is important because it is necessary for inferencing. There is evidence that inferencing is used more in the comprehension of text than has previously been recognized (Clark & Clark, 1977; Nix, 1977). Many times, inferencing is absolutely necessary in order to understand a passage at all. It has also been suggested that inferencing enables a reader to process to a deeper level, which is an aid to memory (Craik & Lockhart, 1972).

Traditionally, teachers have been urged to provide students with the knowledge they need in order to understand a particular text or to make appropriate schemata that the children already possess more available by giving an introduction to the text. Basal readers often supply such introductions as illustrated by the following introductory paragraph from a story in a basal reader.

> Going to a new school and making new friends can be a challenge for anyone. Earl makes it even harder for Susan Bearskin, who has just moved with her family from a reservation to the city. How will Susan respond to this challenge?
>
> (Clymer, Stein, Gates & McCullough, 1976, p. 12)

The importance of background knowledge can be illustrated by children's recalls of this passage about Venice:

> There is a city in Europe that does not have a paved street. It does not have one made of dirt. There are no cars. No subways. No four-wheel drive buses. The name of the city is Venice.
>
> (Rauch & Clements, 1974, p. 21)

Two good readers who read this paragraph had heard about Venice before. Their recalls give evidence of how they used their prior knowledge in understanding this text. For example, when Michael, whose aunt and uncle had been to Venice read the paragraph, this was his recall. "They have no cars, no buses, no trains." When asked what it said about the streets, he said that the streets were made of water. The paragraph didn't say that at all. Michael clearly made an inference based on his prior knowledge. Veronica read this same paragraph and also the paragraph that followed it:

> Over 1,000 years ago this city was erected on many small islands. The islands are in Italy in the Adriatic Sea. Waterways are the streets and avenues of this city. They are called canals. These canals are filled with gondolas, just as your streets are filled with cars. Traffic jams are everywhere.
>
> (Rauch & Clements, 1974, p. 21)

After saying that she had no idea what a gondola was and that she had never heard of Venice, Veronica recalled these two paragraphs as follows: "It's about a city with no cars and streets. They have boats instead of cars." When asked how she knew that, she said that the story said waterways are the streets and there were no paved roads and no dirt roads, so they must have boats instead of cars. Her logic was impressive, but when she had finished reading the rest of the story, she said, "Do gondolas look like this?" making the shape of a gondola with her hands. When asked

how she knew that, she said that she thought she had seen a television cartoon showing a place where the roads were made of water and where there were boats like that. She, too, was making use of prior knowledge, which the text apparently called forth. Her prior knowledge was not as explicit as Michael's but it evidently helped her.

Some of the children, however, did not have a frame for a city like Venice. They had a real problem with the same text. Here are three children's recalls of the same first paragraph.

> Mary's Recall: There were no dirt streets. Every street was paved. The city was Venice.
>
> Cathy's Recall: It's about paved streets and unpaved streets. There is only one street that is not paved. There is one street that is dirt and there's no cars there.
>
> Carol's Recall: It's about a city called Venice. There are no buses with four wheels, no paved-down roads, a lot of dirt.

One might view the children's problem as a problem of fitting the facts as they are stated into their own schema of city, in which streets and cars play a vital role. Thus, the passage may be remembered as talking about dirty streets rather than no streets, as saying that there are no four-wheeled buses rather than that there are no buses.

One of these three children is a poor reader. The other two are good readers whom we worked with in order to compare their performance to that of our poor readers. This text was very difficult for even the good readers.

However, the good readers accommodated. They modified their original frame or schema about cities on the basis of the information they gained by reading the rest of the text, which described gondolas, canals, and other features of Venice. These good readers were able to do this because they made use of bottom-up as well as top-down processes.

The poor readers who over-relied on their prior knowledge didn't know anything new when they finished reading, because they made the text fit what they already knew. What they did can be illustrated by some recalls of a text that gives the new information more explicitly than the Venice text.

> Text: Many people think a gorilla is a wild and dangerous animal. After all, he is very big. He has very strong arms. He looks like he could pick you up and throw you a mile. When he beats his chest and roars, it is very frightening. It is easy to think of him hunting and eating smaller animals. But gorillas really eat only plants. If you meet a gorilla in the jungle, he will probably run away before you do. Does that sound like the King-Kong sort of monster you see in the movies? (Meyers & Zinar, 1979)
>
> Virginia's Recall: Many people think gorillas are really strong and stuff. Gorillas can pick you up and it looks like they can throw you a mile. Gorillas are really strong. If a gorilla beats on his chest, it's really frightening. Gorillas are in the jungle. They look like they can eat smaller animals.
>
> Linda's Recall: Gorillas frighten people. They have strong arms. They always bang their chests, and that is when you get very frightened. And it says that is like King Kong in the movies.

It can be seen that what did not fit the frame was omitted. When these children were asked what a gorilla would do if he met a person in the woods, each replied, "He would kill him."

The children had been questioned a few days before reading this passage to determine what they already knew about gorillas. Their prior knowledge, rather than what the text said, predicted their recalls.

Some poor readers were able to answer correctly that a gorilla would run away if he met a person in the woods. They noted the surprising information in their recalls and then answered the question correctly. Only those poor readers who consistently used a non-accommodating strategy answered the question incorrectly.

Although we must all use what we already know to help us understand what we read, Bobrow and Norman (1975) have suggested that the efficient processor is one who focuses on the unexpected and processes the expected superficially. There is evidence that efficient readers do process expected information superficially (Spiro & Esposito, 1977), but the poor readers we are describing apparently do not. They focus on what they already know.

These children who make use of a non-accommodating strategy do not learn well from written language. They are disabled in the comprehension of written language when the text contains new information. Yet they do learn. The fact that they are of adequate intelligence and can learn information presented orally in class by their teachers is evidence of this. In addition, they do not appear to have any overt language problems. As we have stated previously, they are highly verbal.

These children all scored in the average range, or higher, on the Information, Similarities, Vocabulary and Comprehension subtests of the WISC-R -- the subtests that Kaufman (1979) identifies as measuring verbal comprehension. Thus, these children would be similar, in this respect, to the subjects in the Weaver and Dickinson (1979) study cited previously. The subjects in that study all had at least adequate scores on the Verbal subtests of the WISC-R, yet they, too, had problems in comprehending

written text.

Our reasons for believing that many children who use a non-accommodating strategy in processing written text should do well on the Verbal subtests of the WISC-R are based on three premises concerning the WISC-R described by Kaufman (1979) as well as on our observations of the children's behavior.

The three premises are:

1. The WISC-R subtests measure what an individual has learned. Thus, the WISC-R is really a kind of achievement test, not the same kind of achievement test as a reading test, but a measure of past accomplishments that is predictive of success in school subjects. (A discrepancy between scores on the WISC-R and on a test of reading achievement is probably the most common basis at the present time for classifying children as learning disabled.)

   Bannatyne (1974) also emphasized the dependence of some WISC-R subtest scores on what a child has already learned. His categorization of the WISC-R subtests included the category "Acquired Knowledge", containing the three verbal subtests of Information, Arithmetic and Vocabulary.

2. The WISC-R subtests are samples of behavior and are not exhaustive.

3. The WISC-R assesses mental functioning only under the fixed conditions specified for administration of the test. The four previously cited Verbal subtests of the WISC-R are designed to measure a child's prior acquisition of information by means of language, his/her ability to use that knowledge to recognize relationships, his/her ability to apply that knowledge to real life situations, and his/her ability to express that knowledge verbally.

On the WISC-R this previously acquired knowledge and ability to apply that knowledge is sampled under fixed conditions that involve asking the child short oral questions that the child answers orally. The child is asked questions on the Information subtest like, "Why does oil float on water?"; on the Similarities subtest, questions like, "How are beer and wine alike?"; on the Vocabulary subtest, questions like, "What does nonsense mean?"; on the Comprehension subtest, questions like, "Why are criminals locked up?"

We have no way of knowing how the child acquired the knowledge necessary for answering these questions. Most of the questions could be answered by children who are alert to the world around them, able to acquire knowledge by means of language, and able to make use of that knowledge.

The children who use a non-accommodating reading strategy appear to us and to their teachers to be alert to the world around them and able to acquire knowledge by means of language. The very strategy that they use to process written text should serve them well on the WISC-R, since the strategy involves making use of what they already know.

We suggest that these children have learned well, and that they have learned by listening; but they have not learned by listening to written text. They have learned by listening to oral language. Although much recent research (e.g., Kavanagh & Mattingly, 1972) has concentrated on the similarities between these forms of language, there are also very real differences (Adams, 1979; Olson, 1977; Halliday, 1980). Schallert, Kleiman, and Rubin (1977) have reviewed the literature on the differences between oral and written language. Most of the differences have been verified only with specific populations, situations, and communicative tasks. Whether these

differences generalize to the age group we are considering has not been verified. Schallert, et al. suggest that samples of speech that children hear should be compared to the texts they read in order to verify the differences with this age group. Some of the differences may explain why the group of non-accommodating poor readers can learn from oral language but not from written text, even when it is presented orally.

The speech children hear is designed especially for them. People who speak to them are usually in the same place as they are, so there is a shared non-linguistic context, and the participants are able to interact with each other. But writers do not prepare a text with one particular reader and situation in mind. According to Cazden (1972), "Written text is the final point on the developmental dimension towards independence from non-linguistic context." (p. 199).

This lack of a shared context removes cues, such as pointing and gesture, that may be important for these children. It also makes deictic terms, that is, words whose interpretation depend on the context of their use, more difficult to understand. Deictic terms include pronouns, time terms such as now or a week ago, and place terms like here or there. In order to understand these terms in written text, a child must take account of the framework set by the text. There is evidence that young children have difficulty taking another person's point of view (Piaget & Inhelder, 1956). Our poor readers may have the same type of difficulty, or they simply may fail to recognize that reading requires taking another perspective. There is evidence that the perspective taken influences what is learned from a story (Pichert & Anderson, 1977). Therefore,

failure to take the perspective of the text would disrupt comprehension.

The lack of interaction may pose a special difficulty for these children. There is ample evidence that speakers modify their language to suit their listeners (Snow, 1972; Gleason, 1973; Gelman & Shatz, 1976). People who speak to these children can monitor the children's comprehension by observing their reactions or asking questions. In a speech situation, these children may receive more clarification through repetition.

One difference between oral and written language is the greater redundancy of oral language. Speakers tend to repeat themselves and to use more words than they would use to communicate the same message in writing (Wilkinson, 1971). Putting the same idea in a slightly different way, Halliday (1980) suggested that oral and written language differ in the amount of lexical density found in the two forms. Lexical density is defined as the number of content words per clause or sentence. It appears that lexical density increases as a function of the amount of monitoring that goes into the production of a discourse. As a result, written text, which is "edited" more than spoken discourse, has greater lexical density. Thus, the oral instruction that children receive is probably less lexically dense than the text they read. This may be especially true of the language addressed to children by teachers.

Intuitively, it seems that teachers would focus attention on new information in many ways. A study by Schallert and Kleiman (1979) described some of the ways teachers do this. The study compared teachers' oral presentations of a topic with presentation of the same topic by

written text. The teachers focused attention on the new information by repeating it in various ways, by asking questions about it, and by directly stating that it was important.

Another difference is that writing tends to be more complex syntactically and more detailed and precise than speech (Horowitz & Berkowitz, 1967; Wilkinson, 1971). There is some evidence that certain types of complex discourse structures or organizations may be more natural in writing (Danks, 1974). Preliminary work by Adams (1979) confirms that children have various ways of avoiding in speech certain complexities that characterize the written materials they must read.

Written text also tends to differ from oral language in the type of information it communicates. The common-sense knowledge communicated by oral language is tied to actions and to particular and concrete events. The knowledge communicated by written language may be more abstract, general, and logical (Olson, 1977).

There is evidence that adults who are illiterate, and thus have not been exposed to written text, exhibit an "empirical bias" in solving problems in logic (Scribner, 1979). Like the poor readers we are considering, they use their world knowledge rather than the cues from the text in answering questions. In the following example from Scribner, the subject's reference is clearly his concrete everyday experience. From this basis he is unable to give a reasonable reply.

The subject was given the following problem:

> All Kpelle men are rice farmers.
> Mr. Smith is not a rice farmer.
> Is he a Kpelle man?

The subject replied:

S: I don't know the man in person. I have not laid eyes on the man himself.

E: Just think about the statement.

S: If I know him in person, I can answer that question, but since I do not know him in person, I cannot answer that question ....(p. 231)

In written language, there is more extensive and complex use of words that signal relationships between sentences and even paragraphs, and thus hold the text together. These include pronouns, conjunctions, time words like then or later, place terms like here and there, as well as many others. The use in the English language of these words, labelled cohesive markers, has been delineated by Halliday and Hasan (1976). These cohesive markers are used in spoken discourse also, but, according to Halliday (1980), the type of cohesion primarily used is apparently related to the rhetorical function of the discourse. The types of markers that are used most extensively in spoken description, for example, are not the same as those used in spoken narratives. Also, the types of cohesive markers used most extensively in narratives are not the same types used most extensively in written expository text. Halliday suggests that conjunctions are explicitly expressed more often in expository prose than in speech. Thus, understanding the functions of the cohesive markers may be even more important in written language.

In our work, we have noted that, even in children's texts, cohesive markers are often crucial to the comprehension of a text. A good example is the following:

> What did a dinosaur look like? That's like asking, "What does a bird look like?" It depends upon what kind of a bird you are asking about. There are many kinds of birds. There are owls and bluebirds and ostriches. But bluebirds, owls and ostriches are all birds. There were many kinds of dinosaurs too. And they didn't look alike any more than birds do. There were thousands of kinds of dinosaurs. (Clymer, Bissett, & Wulfing, 1976, p. 189)

Most of the poor readers who use a non-accommodating strategy were quite unable to detect the relationship between the information about birds and the information about dinosaurs. An analysis of the text suggests that this relationship is signalled in large part by the cohesive marker too.

Apparently, cohesive markers are not salient for these poor readers. Weaver and Dickinson (1979) found that poor readers with good verbal ability remember and introduce relatively few of these markers in trying to recall a text.

Earlier, the advantages of classifying learning problems according to the strategies the learners use was pointed out. However, once the learning problem has been linked with a particular strategy, it may sometimes be possible for the researcher to gain an understanding of the influences that led to the adoption of the particular strategy.

In the case of a non-accommodating strategy that represents an over-reliance on prior knowledge, there are several plausible etiologies that can be explored profitably once children have been identified whose written language comprehension disability involves that strategy. One general reason for adopting a strategy that relies on prior knowledge might be its usefulness. In text that is consistent with prior knowledge, such a

strategy will often be successful. During text processing, such a strategy might often result in selecting for retention in the short-term memory buffer those propositions that would be most helpful in linking prior text to new text. Such a strategy might also compensate for deficiencies, such as lack of decoding skills or limited short-term memory capacity that reduce processing ability at more basic levels. Examination of reading instructional materials suggests that many of the texts these children would have read in the early grades and many of the questions their teachers would have asked about these texts, were structured in such a way that the strategy of relying on background knowledge was reinforced (MacGinitie, 1979).

Poor readers like those we have identified tend to have poor verbatim memory for what they read (Weaver & Dickinson, 1979). Relying on prior knowledge might be a retrieval strategy that allows them to reconstruct what the text must have said when they forget what it did say.

The response of these poor readers to another task gives support to the view that they use prior knowledge as part of a retrieval strategy. We constructed texts that contained highly associated nouns and verbs such as gun and shoot. However, in the text, the two words were not associated with each other. In fact, in the text given below, the association was explicitly denied.

> Mr. and Mrs. Johnson went to Hollywood. They were watching people film a T.V. show. It was about a policeman who never carried a gun. The man started shooting the show with the camera when the director told him to.

The text was read to the child, then the child was asked for a free recall. After the recall, the child was asked about the story: "The story said someone was shooting something. Who was shooting? What was

he shooting with?" The poor readers gave many more association responses than correct responses to these questions. (High Association responses would be "the policeman", "a robber", or "the gunman" to the first question, and "a gun" to the second question.) The children's recalls were analyzed to determine whether they contained information relevant to the questions. The relevant recalled information was then classified as being incorrect, correct-recoded, or exact.

A recall was judged incorrect if it included the association between shoot and gun that had been denied in the text. An example of a recall judged incorrect is: "They went to Hollywood. They went to a studio. There was a play on. The policeman that never had a gun -- he shooted when the captain told him to."

A recall was judged correct-recoded if it included the information about the policeman not carrying a gun and mentioned the filming, but did not apply the word shoot to the filming. An example of a recall judged correct-recoded is: "They saw a film about a policeman who never carried a gun. The director told the man who was turning the film to turn it."

A recall was judged exact if it included the information about the policeman not carrying a gun and explicitly applied the word shoot to the filming. An example of a recall judged exact is: "They saw some people shooting a movie, and there was a policeman who never carried a gun."

The association errors of children with incorrect recalls may simply represent cases in which the children did not recall the key information in the story and so responded to the question with a response based on prior knowledge. When the exact form of the key text information was recalled, there were very few association errors in answering the question.

However, when the events of the text were recoded so that recall was correct, but not in the exact form of the text, there were many more association errors and fewer correct responses.

The incongruity represented by these errors after correct-recoded recalls is both fascinating and disturbing: How is it that a child can appear to have a good understanding of a text, as judged by recall of the text, yet give an incorrect answer to a simple question about it? There are at least two possible explanations, both quite interesting as partial explanations of the low performance of some learning disabled children on reading comprehension measures. One is that portions of the question itself are somehow incorporated into the recoded text rather than the question being used as a guide to analysis of the recoded text. In other words, a particular word in the question may elicit a particular frame that interferes with the information these children derived from the text and causes them to reconstruct, on the basis of their prior knowledge, what it probably said. The second possibility is the hypothesis that led to the development of the task. This hypothesis was that words or propositions in the text stimulate some children with written language comprehension disabilities to incorporate incongruent or superfluous background information into their recallings of the text.

In summary, within the group of children who are disabled in the comprehension of written language, we have identified a subgroup of children who have good verbal intelligence but who over-rely on their prior knowledge in processing written language, assimilating data presented in the text to their schemata but failing to accommodate their schemata to the data, with the result that they misinterpret text that does not conform to their prior

knowledge and have difficulty learning new information from written language. The fact that they do learn from oral language may be explained by differences between oral and written language, notably, differences in redundancy, degree of dependence on situational context, complexity, and cohesiveness. Their particular difficulty with written language may be explained by the fact that it provides different types of cues and that they fail to use those cues that it does provide. The success of these children on the tasks that constitute verbal intelligence tests can be explained by the fact that these tasks measure prior knowledge and the ability to apply it; they require the very strategy that, when over-used, causes the difficulty in comprehending written language.

In our current work, we are studying how the children who use a non-accommodating strategy respond to other diagnostic language tasks. The aim of these studies is a deeper understanding of the nature and consequences of this strategy. One study systematically varies the degree to which text information contradicts prior knowledge. The effect of the location and explicitness of this information is also being studied. A future study will use texts requiring different types of inferencing. There is evidence from other studies that poor readers of the type we are considering do make inferences (Weaver & Dickinson, 1979; Tierney, Bridge, & Cera, 1978 - 1979). The type of inference they make, however, appears to differ in some ways from that of good readers (Tierney, Bridge, & Cera, 1978 - 1979). One likely difference is in the relative difficulty for them of the two inference types distinguished by Crothers (1979). A posteriori inferences, which are derived from the passage itself and

require interrelating portions of the text, should be much more difficult for the non-accommodating readers than *a priori* inferences, which are drawn from background knowledge and do not depend on connection to preceding information in the text.

Still other explorations that should help us understand these children better involve their use and understanding of cohesive markers and the nature of their short-term memory capacity. Our experience so far suggests that helping these children attend to cohesive markers in the text may be one appropriate emphasis in the treatment of their difficulty. A full understanding of the children's disabilities and the development of effective treatment techniques is the ultimate goal of our work.

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